Amendments to the Claims

Please cancel Claims 8-12, 14, 21, 29, 39-43, 45, 52, and 62-63. Please amend Claims 1-7, 13, 15-20, 22-26, 28-38, 44, 46-51, and 53-61. Please add new Claims 64-73. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently Amended) ~~In a communications system for transmitting a near-end digital signal using a compression code comprising a plurality of parameters including a first parameter, said parameters representing an audio signal comprising a plurality of audio characteristics, said compression code being decodable by a plurality of decoding procedures, said communications system also transmitting a far-end digital signal using a compression code,~~ An apparatus for reducing echo in a ~~said near-end digital~~ near-end signal in a communication system including near-end and far-end signals, the near-end signal including a plurality of parameters, the apparatus comprising:

~~a reading unit responsive to said near-end digital signal to read at least said first parameter of said plurality of parameters,~~

~~a decoder to perform at least one of said plurality of decoding procedures on said near-end digital signal and said far-end digital signal and generate at least partially decoded near-end signals and at least partially decoded far-end signals, responsive to said at least partially decoded near-end signals and at least partially decoded far-end signals, an adjustment unit to adjust said first parameter to generate an adjusted first parameter,~~

an echo likelihood ~~estimator~~ estimation module to ~~estimate~~ generate an echo likelihood estimate representative of a likelihood of an echo signal in a partially decoded ~~near-end~~ near-end signal as a function of a ratio of ~~powers of~~ a power of a present subframe of the ~~near-end~~ near-end signal and ~~the~~ and power of past values of ~~far-end~~ far-end subframes in a buffer ~~signal~~;

~~responsive to said echo likelihood estimate, a replacement unit to replace~~ an

echo reduction module to reduce echo in the near-end signal as a function of replacing at least ~~said~~ a first parameter of the plurality of parameters with an ~~said~~ adjusted first parameter ~~in said near-end digital signal to reduce echo in the near-end digital signal,~~ responsive to the echo likelihood estimate; and

a transmitter to transmit ~~said~~ the ~~near-end~~ near-end digital signal with reduced echo.

2. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 1~~, wherein said first parameter is a quantized first parameter and wherein said~~ further including an adjustment ~~unit~~ module that generates ~~said~~ the adjusted first parameter ~~in part by~~ as a function of quantizing ~~said adjusted~~ the first parameter ~~before writing said adjusted first parameter into said near-end digital signal~~.

3. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[1,]] 64 wherein ~~said~~ the echo likelihood ~~estimator~~ estimation module is arranged ~~responsive~~ to ~~said at least partially decoded near-end signals and said at least partially decoded far-end signals to~~ generate ~~an~~ the echo likelihood ~~signal~~ estimate as a function of an ~~representing the~~ amount of echo present in ~~said~~ the partially decoded ~~near-end~~ near-end ~~signals, and wherein said adjustment unit is responsive to said echo likelihood~~ signal ~~to adjust said first parameter~~.

4. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[3,]] 1 wherein ~~said characteristics comprise spectral shape and wherein said~~ the first parameter of the plurality of parameters includes at least one of ~~comprises~~ a representation of filter coefficients~~, and wherein said adjustment unit is responsive to said echo likelihood signal to adjust said representation of filter coefficients towards a magnitude frequency response~~ a codebook gain, codebook vector parameter, pitch period parameter, or pitch gain parameter.

5. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 4[[,]] wherein ~~said~~ the representation of filter coefficients ~~comprises~~ includes line spectral frequencies.

6. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 4[[,]] wherein ~~said~~ the representation of filter coefficients ~~comprises~~ includes log area ratios.

7. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[4,]] 66 wherein ~~said~~ the magnitude frequency response corresponds to background noise.

8-12. (Cancelled).

13. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[12,]] 4 wherein ~~said~~ the representation of filter coefficients ~~comprises~~ includes at least one of log area ratios or line spectral frequencies.

14. (Cancelled).

15. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[12,]] 4 wherein ~~said~~ the representation of filter coefficients corresponds to a linear predictive coding synthesis filter.

16. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[1,]] 64 wherein ~~said first parameter corresponds to a first characteristic of said plurality of audio characteristics, wherein said plurality of decoding procedures comprises~~ the decoder module is arranged to employ at least one decoding procedure ~~avoiding~~ to avoid substantial altering of ~~said~~ a first characteristic of the near-end signal ~~and wherein said decoder avoids performing said at least one decoding procedure~~.

17. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 16[[,]] wherein ~~said audio~~ the first characteristic of the near-end signal is ~~comprises~~ power ~~and wherein said first characteristic comprises power~~.

18. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 16, wherein ~~said~~ the at least one decoding procedure ~~comprises~~ includes post-filtering.

19. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 1[[,]] wherein ~~said~~ the transmitter is arranged to transmit the near-end and far-end signals using a compression code ~~comprises a linear predictive code~~.

20. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[1,]] 19 wherein ~~said~~ the compression code ~~comprises~~ includes at least one of a linear predictive code, regular pulse excitation – long term prediction code, or code excited linear prediction code.

21. (Cancelled).

22. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 1[[,]] wherein ~~said~~ the first parameter of the plurality of parameters ~~comprises~~ includes a series of first parameters received over time~~, wherein said reading unit is responsive to said near end digital signal to read said series of first parameters, and wherein said adjustment unit is responsive to said at least partially decoded near end and far end signals and to at least a plurality of said series of first parameters to generate said adjusted first parameter~~.

23. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[1,]] 19 wherein ~~said~~ the compression code is arranged in frames of ~~said digital~~ the near-end and far-end signals, ~~and wherein said~~ the frames ~~comprise~~ including a plurality of subframes each ~~comprising~~ including ~~said~~ the first parameter~~, wherein said reading unit~~

~~is responsive to said compression code to read at least said first parameter from each of said plurality of subframes, and wherein said replacement unit replaces said first parameter with said adjusted first parameter in each of said plurality of subframes~~.

24. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[23,]] 1 wherein ~~said reading unit reads said first parameter from a first of said subframes, said decoder begins to perform at least a plurality of said decoding procedures on said near end digital signal during said first subframe and said replacement unit~~ the echo reduction module is arranged to ~~replaces~~ replace a ~~said~~ first parameter in a subframe ~~with said adjusted first parameter~~ before ~~processing~~ replacing a first parameter of a subsequent subframe ~~following the first subframe so as~~ to achieve lower delay.

25. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 1[[,]] wherein the echo reduction module ~~said compression code~~ is arranged ~~in frames of said digital signals and wherein said frames comprise a plurality of subframes each comprising said first parameter, wherein said decoder performs at least a plurality of said decoding procedures during a first of said subframes to generate said at least partially decoded near end and far end signals, said reading unit reads said first parameter from a second of said subframes occurring subsequent to said first subframe, said adjustment unit generates said adjusted first parameter in response to said at least partially decoded near end and far end signals and said first parameter, and said replacement unit replaces~~ to replace ~~said~~ a first parameter ~~of said second~~ in a subframe with ~~said~~ an adjusted first parameter of a previous subframe.

26. (Currently Amended) An apparatus for reducing echo ~~In~~ in a communications system ~~for transmitting~~ including a ~~near end~~ near-end and far-end ~~digital signal~~ signals, the near-end signal ~~comprising~~ including code samples, ~~said~~ the code samples ~~comprising~~ including first bits ~~using a compression code~~ and second bits ~~using a linear code, said code samples representing an audio signal, said audio signal having a plurality of audio characteristics, said system also transmitting a far end digital signal~~, the apparatus ~~for~~

~~reducing echo~~ comprising:

an echo likelihood estimation module to generate an echo likelihood estimate representative of a likelihood of an echo signal in a partially decoded near-end signal as a function of a ratio of a power of a present subframe of the near-end signal and power of past values of far-end subframes in a buffer;

~~a processor responsive to said near-end digital signal and said far-end digital signal~~ an adjustment module to adjust said first bits and said second bits~~, without decoding said compression code in said near-end digital signal,~~ to reduce echo in the ~~near-end~~ near-end ~~digital~~ signal; and

a transmitter module to transmit ~~the~~ adjusted first and second bits ~~in an adjusted state~~ to a ~~far-end~~ far-end device to present ~~the first and second bits~~ in an audible form to an end user.

27. (Cancelled)

28. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 26[[,]] wherein ~~said~~ the second bits are arranged to employ a linear code, the linear code ~~comprises~~ including pulse code modulation (PCM) code.

29. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 26[[,]] wherein the first bits are arranged to employ a compression code, ~~said~~ the compression code including samples that conform to ~~the~~ a tandem-free operation of ~~the~~ a global system for mobile communications standard.

30. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim 26[[,]] wherein ~~said~~ the first bits ~~comprise the~~ include two least significant bits of ~~said~~ the code samples and ~~wherein said~~ the second bits ~~comprise the 6~~ include six most significant bits of ~~said~~ the code samples.

31. (Currently Amended) ~~Apparatus, as claimed in~~ The apparatus of claim [[29,]] 30 wherein ~~said 6~~ the six most significant bits ~~comprise~~ of the code sample include PCM code.

32. (Currently Amended) A method for reducing echo ~~In~~ in a communications system ~~for transmitting a near-end digital signal using a compression code comprising~~ including near-end and far-end signals, the near-end signal including a plurality of parameters ~~including a first parameter, said parameters representing an audio signal comprising a plurality of audio characteristics, said compression code being decodable by a plurality of decoding procedures, said communications system also transmitting a far-end digital signal using a compression code~~, [[a]] the method ~~of reducing echo in said near-end digital signal~~ comprising:

~~reading at least said first parameter of said plurality of parameters in response to said near-end digital signal;~~

~~performing at least one of said plurality of decoding procedures on said near end digital signal and said far-end digital signal to generate at least partially decoded near-end signals and at least partially decoded far-end signals;~~

~~adjusting said first parameter in response to said at least partially decoded near-end signals and at least partially decoded far-end signals to generate an adjusted first parameter;~~

~~estimating~~ generating an echo likelihood estimate representative of a likelihood of an echo signal in ~~said~~ a partially decoded ~~near-end~~ near-end signal as a function of a ratio of ~~powers~~ power of ~~the near-end~~ a present subframe of the near-end signal and ~~the~~ power of past values of ~~far-end~~ far-end subframes in a buffer ~~signal~~;

reducing echo in the near-end signal as a function of replacing at least ~~said~~ a first parameter of the plurality of parameters with ~~said~~ an adjusted first parameter ~~in said near-end digital signal, in response~~ responsive to ~~said~~ the echo likelihood estimate;~~, to reduce echo in the near-end digital signal,~~ and

transmitting ~~said~~ the ~~near-end digital~~ near-end signal with reduced echo.

33. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32~~, wherein said first parameter is a quantized first parameter and wherein said adjusting comprises~~ further including generating ~~said~~ the adjusted first parameter ~~in part by~~ as a function of quantizing ~~said adjusted~~ the first parameter.

34. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32~~, wherein said adjusting comprises~~ further including generating ~~an~~ the echo likelihood ~~signal~~ estimate as a function of an ~~representing the~~ amount of echo present in ~~said~~ the partially decoded ~~near-end signals in response to said at least partially decoded near-end signals and said at least partially decoded far-end signals, and wherein said adjusting further comprises adjusting said first parameter in response to said echo likelihood~~ near-end signal.

35. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32[[,]] wherein ~~said characteristics comprise spectral shape and wherein said~~ the first parameter ~~comprises~~ includes at least one of a representation of filter coefficients, ~~and wherein said adjusting comprises adjusting said representation of filter coefficients towards a magnitude frequency response in response to said echo likelihood signal~~ a codebook gain, codebook vector parameter, pitch period parameter, or pitch gain parameter.

36. (Currently Amended) ~~A method, as claimed in~~ The method of claim 35[[,]] wherein ~~said~~ the representation of filter coefficients ~~comprises~~ includes line spectral frequencies.

37. (Currently Amended) ~~A method, as claimed in~~ The method of claim 35[[,]] wherein ~~said~~ the representation of filter coefficients ~~comprises~~ includes log area ratios.

38. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[35,]] 70 wherein ~~said~~ the magnitude frequency response corresponds to background noise.

39-43. (Cancelled).

44. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[43,]] 35 wherein said representation of filter coefficients comprises line spectral frequencies.

45. (Cancelled).

46. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[43,]] 35 wherein ~~said~~ the representation of filter coefficients corresponds to a linear predictive coding synthesis filter.

47. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[32,]] 68 ~~wherein said the first parameter corresponds to a first characteristic of said plurality of audio characteristics, wherein said plurality of decoding procedures comprises~~ further including employing at least one decoding procedure to at least partially decode the near-end signal to ~~avoiding~~ avoid substantial altering of ~~said~~ a first characteristic ~~and wherein said performing at least a plurality of said decoding procedures comprises avoiding performing said at least one decoding procedure~~ of the near-end signal.

48. (Currently Amended) ~~A method, as claimed in~~ The method of claim 47[[,]] wherein ~~said audio~~ the first characteristic of the near-end signal is ~~comprises~~ ~~power and wherein said first characteristic comprises~~ power.

49. (Currently Amended) ~~A method, as claimed in~~ The method of claim 47[[,]] wherein ~~said~~ the at least one decoding procedure ~~comprises~~ includes post-filtering.

50. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[32,]] 54 wherein ~~said~~ the compression code ~~comprises~~ includes a linear predictive code.

51. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[32,]] 54 wherein ~~said~~ the compression code ~~comprises~~ includes at least one of a linear predictive code, regular pulse excitation long-term prediction code, or code excited linear prediction code.

52. (Cancelled).

53. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32[[,]] wherein ~~said~~ the first parameter of the plurality of parameters ~~comprises~~ includes a series of first parameters received over time~~, wherein said reading comprises reading said series of first parameters, and wherein said adjusting comprises generating said adjusted first parameter in response to said at least partially decoded near-end and far-end signals and to at least a plurality of said series of first parameters~~.

54. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32[[,]] ~~wherein said compression code is arranged in frames of said digital signals and wherein said frames comprise a plurality of subframes each comprising said first parameter, wherein said reading comprises reading at least said first parameter from each of said plurality of subframes in response to said~~ further including transmitting the far-end and near-end signals using a compression code, the compression code included in frames of the near-end and far-end signals, the frames including a plurality of subframes each including the ~~and wherein said replacing comprises replacing said first parameter with said adjusted~~ first parameter ~~in each of said plurality of subframes~~.

55. (Currently Amended) ~~A method, as claimed in~~ The method of claim [[32,]] 54 ~~wherein said reading comprises reading said first parameter from a first of said subframes, wherein said performing comprises beginning to perform at least a plurality of said decoding procedures on said near-end digital signal during said first subframe and wherein said replacing comprises~~ further including reducing echo in the near-end signal as a function of replacing ~~said~~ a first parameter ~~with said adjusted first parameter~~

in the subframe before ~~processing a subframe following the first~~ before replacing a first parameter of a subsequent subframe ~~so as~~ to achieve lower delay.

56. (Currently Amended) ~~A method, as claimed in~~ The method of claim 32~~, wherein said compression code is arranged in frames of said digital signals and wherein said frames comprise a plurality of subframes each comprising said first parameter, wherein said performing comprises performing at least a plurality of said decoding procedures during a first of said subframes to generate said at least partially decoded near end and far end signals, wherein said reading comprises reading said first parameter from a second of said subframes occurring subsequent to said first subframe, wherein said adjusting comprises generating said adjusted first parameter in response to said at least partially decoded near end and far end signals and said first parameter, and wherein said replacing comprises~~ further including replacing ~~said~~ a first parameter ~~of said second~~ in a subframe with ~~said~~ an adjusted first parameter of a previous subframe.

57. (Currently Amended) A method for reducing echo ~~In~~ in a communications system ~~for transmitting~~ including ~~a near end~~ near-end and far-end ~~digital signal~~ signals, ~~comprising~~ the near-end signal including code samples, ~~said~~ the code samples ~~comprising~~ including first bits ~~using a compression code~~ and second bits ~~using a linear code, said code samples representing an audio signal, said audio signal having a plurality of audio characteristics, said system also transmitting a far end digital signal~~, [[a]] the method ~~of reducing echo in said near end digital signal,~~ comprising:

generating an echo likelihood estimate representative of a likelihood of an echo signal in a partially decoded near-end signal as a function of a ratio of power of a present subframe of the near-end signal and power of past values of far-end subframes in a buffer;

adjusting ~~said~~ the first bits and ~~said~~ the second bits~~, without decoding said compression code in said near end digital signal, in response to said near end digital signal and said far end digital signal~~ to reduce echo ~~characteristics of said~~ in the near-end ~~digital~~ signal as a function of the echo likelihood estimate; and

transmitting the first and second bits ~~in an adjusted state~~ to a far end device to present ~~the first and second bits~~ in audible form to an end user.

58. (Currently Amended) [[A]] The method~~, as claimed in~~ of claim 57~~, wherein said~~ further including employing linear code in the second bits, the linear code ~~comprises~~ including pulse code modulation (PCM) code.

59. (Currently Amended) [[A]] The method~~, as claimed in~~ of claim 57~~, wherein said~~ further including employing a compression code in the first bits, the compression code including samples that conform to ~~the~~ a tandem-free operation of ~~the~~ a global system for mobile communications standard.

60. (Currently Amended) [[A]] The method~~, as claimed in~~ of claim 57[[,]] wherein ~~said~~ the first bits ~~comprise the~~ include two least significant bits of ~~said~~ the code samples and ~~wherein said~~ the second bits ~~comprise the 6~~ include six most significant bits of ~~said~~ the code samples.

61. (Currently Amended) [[A]] The method~~, as claimed in~~ of claim 60[[,]] wherein ~~said 6~~ the six most significant bits ~~comprise~~ include PCM code.

62-63. (Cancelled).

64. (New) The apparatus of Claim 1 further including a decoder module to at least partially decode the near-end and far-end signals and generate a partially decoded near-end signal and a partially decoded far-end signal.

65. (New) The apparatus of Claim 1 wherein the plurality of parameters include a plurality of audio characteristics of an audio signal, the plurality of audio characteristics including at least one of a spectral shape of the audio signal, an overall level of the audio signal, period of long-term correlation, or strength of long-term correlation.

66. (New) The apparatus of Claim 4 wherein the echo reduction module is arranged to adjust the representation of filter coefficients towards a magnitude frequency response.

67. (New) The apparatus of Claim 23 wherein the echo reduction module is arranged to reduce echo in the near-end signal as a function of replacing at least the first parameter of the plurality of parameters in each of the subframes with an adjusted first parameter responsive to the echo likelihood estimate.

68. (New) The method of Claim 32 further including at least partially decoding the near-end and far-end signals and generating a partially decoded near-end signal and a partially decoded far-end signal.

69. (New) The method of Claim 32 wherein the plurality of parameters include a plurality of audio characteristics of an audio signal, the plurality of audio characteristics including at least one of a spectral shape of the audio signal, an overall level of the audio signal, period of long-term correlation, or strength of long-term correlation.

70. (New) The method of Claim 35 further including adjusting the representation of filter coefficients towards a magnitude frequency response.

71. (New) The apparatus of Claim 54 further including replacing at least the first parameter of the plurality of parameters in each of the subframes with an adjusted first parameter responsive to the echo likelihood estimate.

72. (New) An apparatus for reducing echo in a near-end signal in a communications system, the communication system transmitting near-end and far-end signals using a compression code, the compression code including a predetermined plurality of parameters including a first parameter, the apparatus comprising:

a decoder module to at least partially decode the near-end signal and read the first parameter;

an echo likelihood estimation module to generate an echo likelihood

estimate estimating the amount of echo in the near-end signal as a function of a power of current subframe of the near-end signal and powers of a buffer of past values of far-end subframe;

an adjustment module to adjust the first parameter of the predetermined plurality of parameters in the near-end signal as a function of the echo likelihood estimate to reduce echo in the near-end signal; and

a transmission module to transmit the near-end signal with reduced echo to a far-end user.

73. (New) A method for reducing echo in a near-end signal in a communications system, the communication system transmitting near-end and far-end signals using a compression code, the compression code including a predetermined plurality of parameters including a first parameter, the method comprising:

at least partially decoding the near-end and far-end signals;

generating an echo likelihood estimate estimating the amount of echo in the near-end signal as a function of a power of current subframe of the near-end signal and a buffer of past values of far-end subframe power values;

adjusting the first parameter of the predetermined plurality of parameters in the near-end signal as a function of the echo likelihood estimate to reduce echo in the near-end signal; and

transmitting the near-end signal with reduced echo to a far-end user.